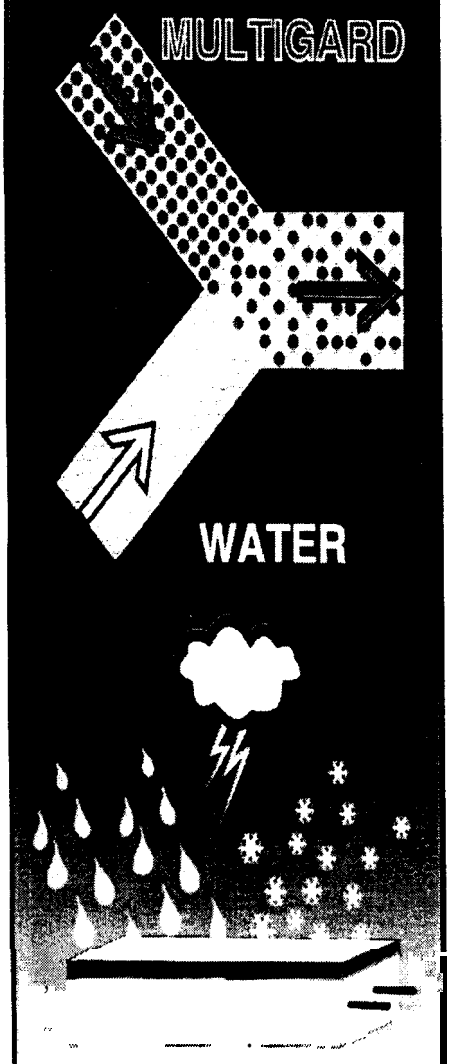
Technology Corner



MULTIGARD penetrates silane treatment layer stops water and salt intrusion into concrete, brick, masonry, and many types of stone without affecting natural vapor permeability

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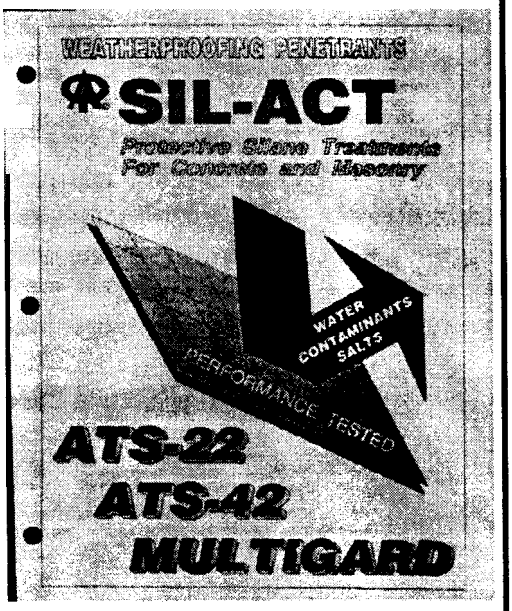
Clear Penetrating Sealers - The Concrete Protection of Tomorrow

The typical design life of concrete structures in Utah has been 30 to 50 years and 20 years on interstate concrete pavements. On the I-15 Corridor Project, along the Wasatch Front, the design life of concrete pavements has been increased to 40 years. Historically, concrete pavements and structures have been constructed with the assumption that they were immune to corrosion and virtually indestructible; however, history has provided us with visual information to the contrary. Basically all unsealed concrete is susceptible to moisture intrusion. This is further compounded when pavements are subjected to freeze-thaw conditions. This freeze-thaw scenario places the concrete in tension, resulting in cracking and premature deterioration. Also, where chlorides are used for deicing, the chloride ions attack imbedded steel causing corrosion resulting in early failure of the concrete.

The UDOT Research Division is presently monitoring an application using sealers on Interstate - 15 in Northern Utah, Lagoon to Layton, on the full width of the northbound lanes. The concrete sealer was applied with a 12 foot wide spreader bar to the existing 20 year old concrete pavement to slow the surface cracking and spalling, prevent moisture and chloride ingress into pavement structure. The chloride content and skid characteristics will be monitored for five years.

Currently, UDOT has a Special Provision (T-490) that allows the use of clear penetrating sealers on concrete. Based on studies to date, it is anticipated this application of a concrete sealer will be beneficial and reduce the maintenance on our concrete structures and pavements.



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This provision resulted from a 5-year study (1990 - 1995) evaluating penetrating sealers. This study was primarily aimed at determining if penetrating sealers could possibly inhibit or slow early cracking and distress of concrete pavements. Nine sealers were evaluated on a section of I-84 in Northern Utah. From that study, the following Myth/Fact relationships were addressed on the use of clear penetrating sealers:

MYTH 1 - Penetrating concrete sealer is not as effective as other systems such as coating, membrane, or additives for protecting concrete reinforcing steel from corroding.

MYTH 2 - Penetrating concrete sealer is not a permanent (one time) treatment and will require repeated applications.

MYTH 3 - Penetrating concrete sealer is more expensive to use than other systems.

MYTH 4 - The skid resistance of the treated surface is always reduced.

MYTH 5 - Concrete sealer cannot penetrate into the surface. It is a coating.

MYTH 6 - Penetrating concrete sealer will not allow internal moisture to evaporate from the concrete. The moisture will be trapped in the concrete.

FACT 1 - Extensive studies using "Moisture Absorption Test Procedure ASTM C-642, Chloride Ponding Test Procedures AASHTO T-259, and T-260" conclusively prove concrete sealer stops the intrusion of water and salt.

FACT 2 -The seal created can last the life of the concrete. Penetrating sealer chemically bonds to the concrete matrix. To break this bond would require destroying the concrete.

FACT 3 - Penetrating concrete sealer is the most economical and cost effective system available. The cost to apply a penetration sealer is equivalent to one year of concrete life.

FACT 4 - Most sealers do not lower the friction propex-ties of the treated surface.

FACT 5 - Concrete sealer penetrates up to 0.5" depending upon the concrete matrix. The concrete becomes a permanent hydrophobic, chloride ion repellant.

FACT 6 - Concrete sealers permit moisture to evaporate from the sealer treated concrete during dry conditions. This process is termed "vapor permeability", 100% vapor transpiration, or "breathing." However, they prevent free water from entering the treated concrete during wet conditions.

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